



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/796,286

03/10/2004

Jason Reid

LAIN-050

9371

20374 7590 07/28/2008

KUBOVCIK & KUBOVCIK

SUITE 1105

1215 SOUTH CLARK STREET

ARLINGTON, VA 22202

EXAMINER

SMOOT, STEPHEN W

ART UNIT

PAPER NUMBER

2813

MAIL DATE

DELIVERY MODE

07/28/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/796,286	<b>Applicant(s)</b> REID ET AL.	
	<b>Examiner</b> Stephen W. Smoot	<b>Art Unit</b> 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14, 16-32, 35, 36, 38, 42-45 and 47-86 is/are pending in the application.
- 4a) Of the above claim(s) 2-14, 16-30, 32, 35, 36, 38, 42-45, 48-55, 57-72 and 77-86 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 31, 56 and 73-76 is/are rejected.
- 7) ☒ Claim(s) 47 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All   b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

This Office action is in response to applicant's RCE filed on 23 June 2008.

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's amendment filed on 23 June 2008 has been entered.

### ***Election/Restrictions***

2. Claims 2-14, 16-30, 32, 35-36, 38, 42-45, 48-55, 57-72, 77-86 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention or to nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 11 July 2006.

***Claim Objections***

3. Claim 31 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim, or amend the claim to place the claim in proper dependent form, or rewrite the claim in independent form.

The further limitation of claim 31 is that the dielectric material comprises a siloxane material. However the parent claim (claim 1) requires the dielectric material to be an organosiloxane polymeric material (see claim 1, lines 11-12).

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Sharangpani et al. (US 6,303,524 B1).

Referring to column 6, line 50 to column 8, line 32, Sharangpani et al. disclose a method of coating a substrate with a low k material that can be methyl silsesquioxane

that includes curing the applied coating at an elevated temperature of about 475 degrees C using a heating rate that is greater than 20 degrees C per second.

Regarding the first elastic modulus limitation of claim 1, the applied coating would inherently have an elastic modulus. Regarding the cured dielectric material having a second elastic modulus that is greater than the first elastic modulus, this feature is presumed to be inherent to the method of Sharangpani et al., per MPEP section 2112.01, because the coating is produced by a method that is substantially identical to the applicant's method as claimed in claim 1. Accordingly, a prima facie case of anticipation has been established for claim 1 and the burden shifts to the applicant to show that their invention is not the same as the prior art of Sharangpani et al.

6. Claims 1, 31, 73-75 are rejected under 35 U.S.C. 102(b) as being anticipated by Ramos et al. (US 6,372,666 B1).

Referring to column 4, line 34 to column 5, line 27 and column 6, line 41 to column 8, line 29, Ramos et al. disclose a method of coating a substrate with a low k material that can be a silsesquioxane polymer or a siloxane polymer that includes curing the applied coating above 350 degrees C for at least 5 seconds. One example for curing the dielectric coating is to place the substrate in contact with a hot plate for a time period that most preferably ranges from 1 to 1.1 minutes, which corresponds to heating the substrate more than 300 degrees C in about 60 seconds or at an average rate of more than 5 degrees per second. The silsesquioxane or siloxane can be substituted

Art Unit: 2813

with alkyls containing 1 to 8 carbons like methyl or with aryls containing 6 to 12 carbons like phenyl (i.e. an aromatic ring structure).

Regarding the first elastic modulus limitation of claim 1, the applied coating would inherently have an elastic modulus. Regarding the cured dielectric material having a second elastic modulus that is greater than the first elastic modulus, this feature is presumed to be inherent to the method of Ramos et al., per MPEP section 2112.01, because the coating is produced by a method that is substantially identical to the applicant's method as claimed in claim 1. Accordingly, a prima facie case of anticipation has been established for claims 1, 31, 73-75 and the burden shifts to the applicant to show that their invention is not the same as the prior art of Ramos et al.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ramos et al. (US 6,372,666 B1) as applied to claim 1 above, and further in view of Grill et al. (US 6,030,904).

As shown above, Ramos et al. anticipate claim 1 of the applicant's invention. Also, Ramos et al. teach that a siloxane composition can be prepared by hydrolysis and condensation of precursors and applying the composition to the substrate by spinning on in the form of a liquid dielectric layer (see column 4, line 34 to column 5, line 52), which are limitations of claim 56. However, Ramos et al. lack a further limitation to claim 1 as set forth in claim 56 of the applicant's invention, which is patterning the coating by selective exposure to electromagnetic radiation or electron beam prior to the curing step. Grill et al. teach that a low k dielectric layer can be patterned either before or after a rapid thermal (RTA) annealing step is performed to stabilize (i.e. cure) the deposited layer (see column 4, line 37 to column 5, line 9).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Ramos et al. and Grill et al. in order to cure the siloxane coating of Ramos et al. after incorporating a step of patterning the coating, as taught by Grill et al. Grill et al. show that the curing step can be performed either before or after the step of patterning the dielectric layer to form damascene structures, trenches, or vias without producing new or unexpected results (see column 4, lines 50-58 and column 5, lines 7-9).

9. Claim 76 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ramos et al. (US 6,372,666 B1) as applied to claim 73 above, and further in view of Yamakawa et al. (US 6,518,204 B2).

As shown above, Ramos et al. anticipate claim 73 of the applicant's invention. However, Ramos et al. lack the further limitation to claim 73 as set forth in claim 76 of the applicant's invention, which is that the organic portion is selected from an alkenyl group having from 2 to 8 carbon atoms, an alkynyl group having from 2 to 8 carbon atoms, or an epoxy group. Yamakawa et al. teach that organopolysiloxanes can include alkenyl groups like vinyl, allyl, butenyl, pentenyl, or hexenyl (see column 3, lines 28-41).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the siloxane polymer of Ramos et al. by using vinyl, allyl, butenyl, pentenyl, or hexenyl as substituents, as taught by Yamakawa et al. Yamakawa et al. recognize that vinyl, allyl, butenyl, pentenyl, or hexenyl substituents function as a curing agent for siloxane (see column 3, lines 28-29).

### ***Allowable Subject Matter***

10. Claim 47 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter: Claim 47 would be allowable because the prior art of record does not teach or suggest, in combination with the other claim limitations, a method of forming a low dielectric constant structure that includes curing a dielectric material at an average rate



of at least 1 degree C per second, wherein the dielectric material is an organosiloxane polymeric material selected from the group as claimed in claim 1, and wherein the dielectric material is formed from a precursor having the composition as claimed in claim 47.

### ***Response to Arguments***

12. Applicant's arguments filed on 23 June 2008 have been fully considered but they are not persuasive.

As argued by the applicant, claim 1 has been amended to include the materials from now cancelled claims 39-41. However, these materials are claimed in the alternative and, accordingly, the prior art rejections based on Sharangpani et al. and Ramos et al. can still be applied for the same reasoning used to reject claim 39 in the prior Office action.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., obtaining essentially nonporous products and/or excellent dielectric properties) are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

### ***Conclusion***

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on Monday to Friday from 8:00am to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Stephen W Smoot/  
Primary Examiner  
Art Unit 2813

SWS